



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/775,431	02/10/2004	Stanford R. Ovshinsky	OCC-8	9747
24963	7590	09/13/2005	EXAMINER	
ENERGY CONVERSION DEVICES, INC. 2956 WATERVIEW DRIVE ROCHESTER HILLS, MI 48309			WENDLER, ERIC J	
			ART UNIT	PAPER NUMBER
			2824	

DATE MAILED: 09/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/775,431

Applicant(s)

OVSHINSKY ET AL.

Examiner

Eric Wendler

Art Unit

2824

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 February 2004.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-29 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-20, 23, 29 is/are rejected.  
7) ☒ Claim(s) 21-22, 24-28 is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 2/10/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2/10/04.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☒ Other: Search History.

## DETAILED ACTION

### *Specification*

1. Applicant is reminded of the proper language and format for an abstract of the disclosure. The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. **The abstract for this application is 203 words in length and must be resubmitted in a shorter, more concise form.**
2. The disclosure is objected to because of the following informalities: the applicant refers to references in the disclosure that are not included in the information disclosure statement PTO-1449 form, which was submitted by the applicant. In order for references to be considered by the examiner, they must appear on the PTO-1449 form. As a result, the examiner has not considered the references listed in the specification. The applicant must either resubmit the PTO-1449 form with these references listed if the applicant wants them to be considered, or must remove these references from the specification altogether. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**4. Claims 1-2, 15, 23 and 29 are rejected under 35 U.S.C. 102(e) as being anticipated by the US Patent to Lee et al (6,862,214).**

5. **Regarding claim 1**, Lee discloses, in Figure 2, a secured device comprising a security element (Fig. 2, MCTR<sub>n</sub>) having an ON and OFF state, with the resistance of the ON state lower than that of the OFF state; a phase-change element (Fig. 2, PCC<sub>n</sub>) comprising a phase-change material being reversibly transformable between two or more structural states; and the two elements are connected in parallel (column 4, lines 14-22).

6. **Regarding claim 2**, Lee discloses, in Figure 2, a security element that is a transistor (Fig. 2, MCTR<sub>n</sub>, column 3, lines 57-59).

7. **Regarding claims 15 and 23**, Lee discloses structural states including amorphous, crystalline, or partially crystalline states, and structural states that include a reset state and a set state (column 1, lines 14-38).

8. **Regarding claim 29**, Lee discloses a method of protecting information that includes a security element (Fig. 2, MCTR<sub>n</sub>) that stores data in a phase-change element (Fig. 2, PCC<sub>n</sub>), and transforms the security element to an ON state (column 4, lines 14-22).

#### ***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

Art Unit: 2824

the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**10. Claims 3-4, and 6 are rejected under 35 U.S.C. 103(a) as being obvious over the US Patent to Lee et al in view of the US Patent to Riggio, Jr. (5,523,970).**

11. Lee, as applied to claim 1 above, fails to teach a security element that is a multi-terminal phase-change device that modulates the current passing between the second and third terminals by using a field effect. Riggio, Jr. teaches the use of a multi-terminal phase-change device 10, 11 that modulates the current passing between the second and third terminals by using a field effect in a memory array similar to that taught by Lee (Figs. 1-3, and column 3, lines 27-30). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the device of Riggio, Jr. into the system of Lee since the multi-terminal phase-change device of Riggio, Jr. is a transistor that would perform the same purpose as the cell transistors of Lee.

**12. Claim 5 is rejected under 35 U.S.C. 103(a) as being obvious over the US Patent to Lee et al in view of the US Patent to Riggio, Jr. (5,523,970), and further in view of the US Patent to Fritzsche et al. (3,876,985).**

13. Lee and Riggio, Jr., as applied to claims 1, 3, and 4 above, fail to teach a multi-terminal device that modulates the current passing between the second and third terminals through injection of charge carriers. Fritzsche et al teaches the use of a multi-terminal device that modulates the current passing between the second and third terminals through injection of charge carriers (Abstract, and column 4, lines 48-57). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the device of Fritzsche et al into the system of Lee, as it performs the

same tasks as the devices of Riggio, Jr. and Lee, but modulates current in a different method.

**14. Claims 7-8, 10-14, and 16-20 are rejected under 35 U.S.C. 103(a) as being obvious over the US Patent to Lee et al in view of the US Patent to Wu (6,545,903).**

**15. With respect to claims 7-8 and 10,** Lee, as applied to claim 1 above, fails to teach that the phase-change element is a register that processes data in a non-binary fashion, or that the phase-change element is a weighting device that has two or more resistance states that resistively modifies a transmission of an electrical signal. Wu teaches a phase-change element that is a register that processes data in a non-binary fashion (column 1, lines 65-67, column 2, lines 1, 52-61, and column 6, lines 42-50), as well a weighting device that has two or more resistance states and resistively modifies transmission of an electrical pulse signal (column 1, lines 61-65). It would have been obvious to one of ordinary skill in the art at the time the invention was made to allow the phase-change element of Lee to act as a register that processes data in a non-binary fashion in order to be able to exhibit multiple states and store multiple bits of data.

**16. With respect to claims 11-14,** Lee, as applied to claim 1 above, fails to teach that the phase-change element is comprised of S, Se, or Te, and further comprised of Ge, Sb, As, Si, or the group consisting of Al, In, Bi, Pb, Sn, P, and O. Wu teaches a phase-change element that is comprised of Sb, Te, and Ge (column 3, lines 47-49, and column 4, lines 29-36) and B, As, or P (column 4, lines 14-17, 44-51). It would have been obvious to one of ordinary skill in the art at the time the invention was made to construct the phase-change element of Lee out of these materials since these are the

periodic elements that are widely known to comprise chalcogenides and phase-change elements.

17. **With respect to claims 16-20**, Lee, as applied to claim 1 above, fails to teach structural states that differ in fractional crystallinity, include one, two, three, or more accumulation states, and include a grayscale state. Wu teaches structural states that differ in fractional crystallinity, one, two, three, or more accumulation states, and a grayscale state (column 1, lines 26-38). It would have been obvious to one of ordinary skill in the art at the time the invention was made to allow for partial crystalline states, multiple accumulation states, and grayscale states in the system of Lee in order to be able to program in non-binary fashion, allowing for the storage of multiple bits of data that can exhibit multiple states.

18. **Claim 9 is rejected under 35 U.S.C. 103(a) as being obvious over the US Patent to Lee et al in view of the US Patent to Wu (6,545,903), and further in view of the US Patent to Okaue et al (6,820,203).**

19. **With respect to claim 9**, Lee and Wu, as applied to claims 1 and 7 above, fail to teach a register that encrypts data or information. Okaue et al teaches the use of registers 111, 114, 115, that work with an encrypting unit 110 to store data (Abstract, and column 19, lines 28-31, and Fig. 20). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the registers of Okaue et al in the system of Lee and Wu since both the system of Okaue and the current invention are security elements and would benefit from encryption of data.

***Allowable Subject Matter***

20. **Claims 21-22, 24-28** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

21. **With respect to claims 21-22**, the prior art fails to teach that the resistance of the security device is equal to the resistances of the phase-change element or the security element.

22. **With respect to claims 24-28**, the prior art fails to teach that the resistances of the ON and OFF states of the security device are greater or lesser than the set or reset states.

***Conclusion***

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Lowrey teaches phase-change materials that store data in amorphous and crystalline states (6,570,784), and phase-change materials that store data in non-binary forms (6,813,177). Fritzsche et al teaches multi-terminal phase-change materials (3,748,501). Czubytyj et al teaches phase-change devices that include a grayscale state and are comprised of S, Se, or Te, and further comprised of Ge, Sb, As, Si, Al, In, Bi, Pb, Sn, P, or O (5,825,046). Westberg teaches the use of register that encrypts data (5,388,096).

When responding to this office action, applicants are advised to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist the examiner in locating the appropriate paragraphs.



Art Unit: 2824

A shortened statutory period for response to this action is set to expire three months and zero days from the date of this letter. Failure to respond within the period for response will cause this application to become abandoned (see MPEP 710.02(b)).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric Wendler whose telephone number is (571) 272-5063. The examiner can normally be reached on Monday - Friday 8AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms can be reached on (571) 272-1869. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

24. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EJW  
9/9/05

  
**ANH PHUNG**  
**PRIMARY EXAMINER**